

XXXII.—Notes upon certain Species of *Æolosoma*.

By FRANK E. BEDDARD, M.A., &c.

§ 1. *The Pigmented Vesicles of Æolosoma quaternarium.*

Although this species appears to be fairly common in England, it is capricious in its occurrence. I have lately met with it in abundance among some *Chara* which was sent to me by Messrs. Bolton, and have been able to some extent to compare its pigment with that of *Æolosoma tenebrarum* (Beddard, "On the Green Cells in the Integument of *Æolosoma tenebrarum*," Proc. Zool. Soc. 1889, p. 51, pl. v.) and *Æolosoma Headleyi* (*infra*, p. 264). The colour of the pigmented spots of this species is an orange-brown; they appear more red when examined under a low power; as the colour of these peculiar glandular cells is often so distinctive of the species, it is confusing to find the descriptions of them in species, which appear to be identical with the present, so different in detail. Lankester ("A Contribution to a Knowledge of the Lower Annelids," Trans. Linn. Soc. vol. xxvi. p. 642) speaks of them as "blood-red;" Vejdovsky ("System und Morphologie der Oligochæten," Prag, 1884, p. 18) describes them as orange-red, but figures them (*loc. cit.* pl. i. fig. 1) as crimson; Maggi ("Intorno al genere *Æolosoma*," Mem. Soc. Ital. Sci. Nat. vol. i. p. 9) differentiates his *Æolosoma balsamo* from other species by the colour of these cells:—"inoltre le macchie, a differenza delle altre, sono di un rosso aranciato;" but I must agree with Vejdovsky in refusing to admit the validity of this species. Schmarda describes a species—*Æolosoma pictum*—which seems hardly to differ from the present, as having purple-red ("purpur-roth") oil-globules; finally Cragin's *Æolosoma Stokesi* ("First Contribution to a Knowledge of the Lower Invertebrates of Kansas," Bull. Wash. Coll. Lab. 1887, no. 8, p. 31), with "bright salmon-red nuclei," is, as I have already suggested (Proc. Zool. Soc. *tom. cit.*), devoid of any characters by which it can be satisfactorily distinguished from *Æolosoma Ehrenbergii* or *Æolosoma quaternarium*. I have observed but little variation in the coloration of the epidermic oil-globules*, such as thereis, for example, in *Æolosoma Headleyi*; it is therefore possible that the apparently different colour of the species mentioned above implies specific distinction; but it is on the whole more probable that the variation

* In one specimen some of the spots were smaller and had a purplish colour.

is confined to the terms used by the authors in their several descriptions.

I can confirm the statement of Vejdovsky that there is no nucleus in the cells containing the coloured oil-globules; so far this species agrees with *Æolosoma Headleyi* and differs from *Æolosoma tenebrarum*, where a nucleus appears to be invariably present in the fully mature cell.

I refer the present species to *Æolosoma quaternarium* on account of the fact that there are no nephridia in the œsophageal segment; they begin, in fact, in the second seta-bearing segment. But I cannot agree with Vejdovsky (*loc. cit.* p. 20) that the pigment-spots are less numerous upon the prostomium than elsewhere; I find considerable variation in this particular, but in many specimens—I rather think in the majority—the oil-globules were quite crowded in the lateral regions of the prostomium.

I have just mentioned the fact that the oil-globules of this species, like those of *Æolosoma Headleyi* and unlike those of *Æolosoma tenebrarum*, are not surrounded by any cell-protoplasm or nucleus, except of course when they are just beginning to be formed; correlated with this is the fact that on treatment with iodine solution there is no deposition of black granules around the coloured oil-globules; this might perhaps be expected to occur in the periphery of the smaller oil-globules, but it does not. The absence therefore of this reaction, which is so characteristic of *Æolosoma tenebrarum*, may perhaps not necessarily indicate a profound difference in the pigment of the three species, *Æolosoma quaternarium*, *variegatum*, and *Headleyi*, as compared with *Æolosoma tenebrarum*. If the explanation which I offered in my paper upon *Æolosoma tenebrarum* (*Proc. Zool. Soc.* 1889, p. 53) of the black stain produced by iodine be correct, viz. that it is a precipitation of elemental iodine caused in some way by the coloured oil-globule, it is perhaps a little difficult to see why the supposed influence of the coloured oil-drop in *Æolosoma quaternarium* does not reach the cells immediately surrounding it with which the oil-globule is so nearly in contact. This theory may of course be wrong; but in the meantime it seems to me to be on the whole more probable that there is so far a difference between the several pigments, and that the orange-brown pigment of *Æolosoma quaternarium* and the bright green pigment of *Æolosoma variegatum* and *Headleyi* may be less perfect as respiratory pigments, and therefore in course of degeneration. In this connexion it is interesting to note that *Æolosoma tenebrarum* is on a decidedly higher level of organization than any of the other species at present

known*. It has a more complex brain as well as considerable traces of a ventral nerve-cord; the number of segments is larger and the nephridia are more numerous, and finally the specialization of the setæ points in the same direction.

Treated with ammonia or with potash the brown colouring was at once dissolved and converted into a fine purple; the purple colour rapidly disappeared, and I never succeeded in treating it with a mineral acid sufficiently promptly to see if the brown colour could be restored. This reaction appears to indicate that the brown colouring-matter is nearly related to the green colour of *Æolosoma tenebrarum* and *Æolosoma Headleyi*, as all three pigments were changed to purple by the action of an alkali; in the last two species, however, the purple was not of so vivid a hue as in *Æolosoma quaternarium*, owing apparently to the presence of a granular detritus precipitated by the action of the reagent; this precipitation was not formed when *Æolosoma quaternarium* was treated with this reagent.

It is, however, important to notice that the three colouring-matters have something in common, though researches into animal pigments have shown that it is equally surprising to find the same or quite different pigments in closely allied forms.

In my paper upon *Æolosoma tenebrarum* I mentioned that the pigment was dissolved by turpentine, forming a bright yellow solution, which after a time became bleached. I have treated *Æolosoma quaternarium* with the same substance and found an analogous reaction; the pigment was dissolved, but slightly altered in colour, becoming reddish brown. I have not had the opportunity of applying this test to *Æolosoma Headleyi*. The alteration in colour, which is similar to that produced upon other colouring substances by turpentine (see for example Krukenberg, *Vergl. physiol. Studien*, l. Reihe, 2 Abth. p. 68), may perhaps be due to ozone.

§ 2. Further Notes upon *Æolosoma Headleyi*.

In my paper descriptive of this species ("Observations upon an Annelid of the Genus *Æolosoma*," *Proc. Zool. Soc.* 1888, p. 213) I have pointed out its resemblances to and differences from *Æolosoma variegatum*, with which species it might possibly be confounded; a short time after completing my study of the species, so far as the material at my disposal

* Some of the remarkable forms (e. g. *Æolosoma macrogaster*) too imperfectly described by Schmarda ('*Reise um die Erde*,' Bd. ii. p. 10, pl. xvii. fig. 154) may prove to be exceptions to this statement.

enabled me to do, I found in water from the same tank a great quantity of examples of *Æolosoma tenebrarum* (see Beddard, "Note upon the Green Cells in the Integument of *Æolosoma tenebrarum*," Proc. Zool. Soc. 1889, p. 51), and was able therefore to record the presence of this species in England for the first time*. The appearance of *Æolosoma tenebrarum* in the same water which produced *Æ. Headleyi* suggested to me that I had made a mistake in distinguishing the latter form as a distinct species. I have, however, again met with *Æ. Headleyi* and have been able to compare it with *Æ. tenebrarum*; this comparison establishes, so far as I can see, the justice of separating the two forms. *Æolosoma Headleyi* is nearly as large a species as *Æ. tenebrarum*—much larger than *Æ. quaternarium*—but differs from it in having *only* capilliform setæ; the green spots are quite different in colour from those of *Æ. tenebrarum*, being of a *bright* green, often with a distinct admixture of blue. The nephridia are as numerous as in *Æ. tenebrarum*, much more numerous than in *Æ. variegatum*, and they commence in the *first* setigerous segment. The green cells when treated with iodine do not show the remarkable black precipitation which is so distinctive of *Æ. tenebrarum*; but, as in that species, they become violet when treated with ammonia. When the worm is subjected to pressure and to the action of acids &c. the contents of the coloured epidermic cells are not expelled in long coiled threads, as in *Æolosoma tenebrarum*. All the facts appear to point to the distinctness of *Æolosoma Headleyi* from *Æ. tenebrarum*—at any rate in the present state of our knowledge of this very interesting genus of Oligochæta.

XXXIII.—*Descriptions of a new Snake and two new Fishes obtained by Dr. H. von Ihering in Brazil.* By G. A. BOULENGER.

Elapomorphus trilineatus.

Rostral as deep as broad, in contact with the anterior angle of the single præfrontal; internasals meeting by their inner angle; frontal not quite so long as its distance from the end

* The occurrence of this form in the Zoological Gardens only is perhaps hardly sufficient to establish it as a British species. I have, however, since my paper was published received examples from Oxford through the kindness of Mr. O. H. Latter, tutor of Keble College. Prof. W. Hatcher Jackson informs me that he has observed an *Æolosoma* with green spots, which is probably the same.